DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: the recitation of "infecting" should be amended to "injecting". Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 6-9, 12 and 14-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al. (EP 1 178 546) in view of Lee et al. ("Improvement of EL efficiency in polymer light-emitting diodes by heat treatments"; hereinafter "Lee 1") and/or Lee et al. (The Effect of Different Heat Treatments on the Luminescence Efficiency on the Luminescence Efficiency of Polymer Light-Emitting Diodes"; hereinafter "Lee 2".

Aziz discloses a method of making an organic light emitting device (abstract), comprising of a light emission region formed between an anode (i.e., a first electrode capable of injecting or accepting charge carriers of a first type) and a cathode (i.e., a second electrode capable of injecting or accepting charge carriers of a second type) [0007]. The light emitting region can comprise of an organic light emitting material such as a polyfluorene [0026]. A heat

treatment can be carried out after formation of the second electrode at a temperature below the glass transition temperature [0085].

Aziz does not explicitly teach heating the polyfluorene before forming the second electrode. Aziz does teach that the layers of the light emission region can be formed by spin coating [0075]. Accordingly, Lee 1 teaches that it was well known to have baked a spin coated light emitting film prior to the formation of the second electrode at a temperature below glass transition temperature (paragraph bridging pg. 249-250). Lee 2 teaches that baking of the light emitting film prior to formation of the second electrode at a temperature below glass transition temperature is to completely remove the residual solvent (paragraph bridging the two columns of pg. 801). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have heated the polyfluorene film of Aziz immediately after spin coating and prior to the formation of the second electrode with a reasonable expectation of success. One would have been motivated to do so in order to have prevented any deterioration of the device due to residual solvent.

Claims 19-21: Aziz teaches that the light emitting region can comprise of an organic light emitting material such as a polyfluorene [0026].

Claims 6,17-18,22-24: The method forms an electroluminescent device.

Claim 7: Aziz teaches that the first electrode can be an anode and that the second electrode can be a cathode [0025].

Claims 8-9: Aziz teaches that the cathode can have a work function between 2.5 eV and 4.0 eV and that it can comprise calcium [0077].

Claim 12: Aziz teaches that a hole transport layer (i.e., a layer of conductive organic material) can be formed between the anode and the polyfluorene [0029],[0071].

Claims 14-15: Aziz teaches that the light emitting portion can be a mixed layer of a hole transport material and an electron transport material [0035]-[0036].

Claim 16: Aziz teaches that the light emission region can emit light colors of red, green, or blue [0045].

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz '546 in view of Lee 1 and Lee 2 as applied to claim 1 above, and further in view of Towns et al (WO 01/62869).

Aziz teaches the use of a polyfluorene material in the light emission region, but does not explicitly teach that the polyfluorene comprises of the structure as claimed in claims 2 and 3. However, Towns teaches that an electroluminescent material comprising of the structure as claimed can be used in the light emitting layer (pg. 18). The polymer can provide solubility, processability, and good efficiency and lifetime in the device (last paragraph of pg. 5). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used the electroluminescent polymer material of Towns as the particular polyfluorene of Aziz with a reasonable expectation of success. One would have been motivated to do so in order to have provided the OLED device with good efficiency and lifetime.

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz '546 in view of Lee 1 and Lee 2 as applied to claim 1 above, and further in view of Hirai (U.S. Publication No. 2001/0028962).

Aziz does not explicitly teach forming a metal fluoride dielectric layer between the polyfluorene and the cathode. However, Hirai teaches that it was well known in the OLED art (abstract) to have formed an electron injecting layer comprising of an insulating thin film between the light emitting layer and the negative electrode. The insulating film can be lithium fluoride (i.e., a metal fluoride) [0046]. The negative electrode of Hirai [0034] can be made of similar materials as the cathode of Aziz [0077]. Because Hirai teaches that such structures were well known in the OLED art, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed an electron injecting layer comprising of an insulating thin film between the light emission region and the cathode of Aziz with a reasonable expectation of success. The selection of something based on its known suitability for its intended use has been held to support a prima facie case of obviousness (MPEP 2144.07).

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz '546 in view of Lee 1 and Lee 2 as applied to claim 12 above, and further in view of Roach et al. (U.S. Publication No. 2001/0055454).

Aziz does not explicitly teach that the hole transport material can be PEDT/PSS. However, Roach teaches that it was well known in the OLED art to have used PEDOT/PSS as a hole transport material [0039]. Because Roach teaches that such a material was operable as a hole transport material, it would have been obvious to one of ordinary skill in the art at the time of invention to have used PEDOT/PSS as the particular hole transport material in the hole transport layer of Aziz with a reasonable expectation of success.

Response to Arguments

8. Applicant's arguments filed 8/14/2009 have been fully considered but they are not persuasive.

Applicant argues on pg. 6-7 that the annealing of Lee 1 and Lee 2 are performed at temperatures above the glass transition temperature. However, the baking step of Lee 1 and Lee 2 used in the rejection is different from the annealing step. The baking step is merely to remove solvent from the coated layer while the annealing step alters the morphology of the emissive polymer and changes its characteristics. Only the baking step of Lee 1 and Lee 2 were used in the rejections. The baking step is performed below the glass transition temperature. Additionally, Aziz explicitly teaches away from annealing temperatures that substantially changes the structure of the OLED layers [0086] but rather that the annealing temperature should be below the glass transition temperature of the material having the lowest glass transition temperature of all of the materials forming the OLED [0085]. The combination of references would have explicitly taught away from using annealing temperatures above the glass transition temperature.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is (571)272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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